

Electronic Warfare

RADAR CROSS-SECTION MEASUREMENTS



The Radar Cross-Section (RCS) Measurement Facility at the Atlantic Test Ranges (ATR) conducts ground-to-air RCS, jammer-to-signal ratio (J/S), and chaff measurements relative to aircraft, helicopters, Unmanned Aerial Systems (UAS), towed targets and decoys. The integrated facilities provide telemetry, tracking data, range control, airborne instrumentation and RCS data acquisition, all in a centralized workstation allowing analysis and display of the ground-to-air RCS measurements in real-time. Data products include amplitude, Doppler, downrange and ISAR imagery.

RADAR CROSS-SECTION FLIGHT PROFILE GENERATION AND EXECUTION

To predict aircraft flightpaths for conducting ground-to-air RCS measurements, flight profiles are developed at ATR and then taken to the Manned Flight Simulator (MFS) at the Air Combat Environment Test & Evaluation Facility (ACETEF). These maneuvers are then flown in the aircraft cockpit of interest. The MFS is equipped to compute and display presented aspects resulting from each of the maneuvers in real-time. Flight cards are generated from this data, which provide the required location and flight parameters to precisely fly each of the validated maneuvers.



Local emitter system at the Cedar Point Complex

FOR MORE INFORMATION

(301) 342-1197 / 1170 / 3682 / 8640 / 3607 / 1181
23013 Cedar Point Road
Patuxent River, MD 20670
PAXR_ATRCONTACT@navy.mil
www.navair.navy.mil/tande/ranges

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RADAR CROSS-SECTION MEASUREMENTS

It is important to measure the interaction between a target and the electromagnetic energy that may impinge upon it for several reasons:

- Provides diagnostic information on radar reflectivity needed for vehicle development or modernization
- Provides a means of quantifying radar reflectivity characteristics to meet specification compliance
- Assesses a target's survivability in a threat environment
- Provides a means to quantitatively assess a target's radar reflectivity through its life cycle
- Provides information used in the development of tactics
- Provides essential information for Electronic Countermeasures (ECM) development
- Provides information for noncooperative target recognition

PROBABILITY DENSITY FUNCTION

Due to a target's vibration, flexing, motion and engine and propeller modulation in a dynamic, in-flight environment, target scintillation is created. Quantifying this characteristic requires consecutive pulse-to-pulse data samples in each aspect cell. From this data, complete statistical information such as mean, standard deviation and the probability density function can be determined. This data completely represents the target's RCS characteristics and performance for survivability analysis.

KEY FEATURES

CAPABILITY

- Ground-to-air measurements
- Whole-body RCS (150 MHz through 35 GHz)
 - Complete statistics
 - Probability density function
- Doppler power spectrum (PRF up to 200 kHz)
 - Engine/Blade modulation
- Aircraft imagery
- Downrange profiles
- Extensive RCS data library
- ECM measurements
 - Jammer-to-signal ratio
 - Jammer technique analysis
 - Chaff bloom rate
 - Antenna pattern

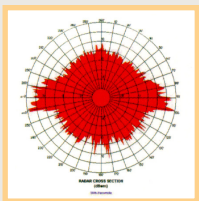
EFFICIENCY

- Real-time data processing and display
- Multiple simultaneous measurements
- Horizontal and vertical polarization
- Flight profiles created with aid of Manned Flight Simulator

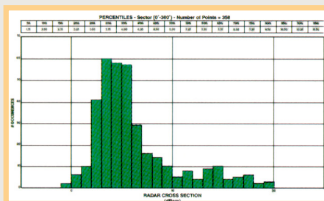
ACCURACY

- RCS amplitude: +0.8/-1.0 dB
- Dynamic range: 80 dB
- Aspect angle: 1 degree both azimuth and elevation

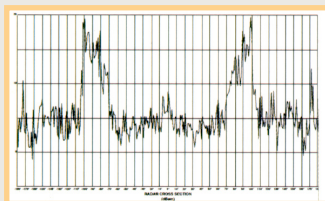
RCS DATA PRODUCTS



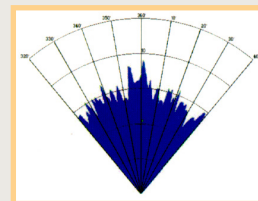
Polar



Histogram

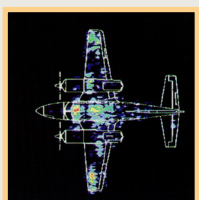


Rectangular

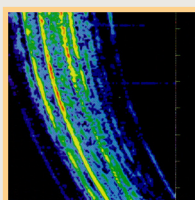


Sector

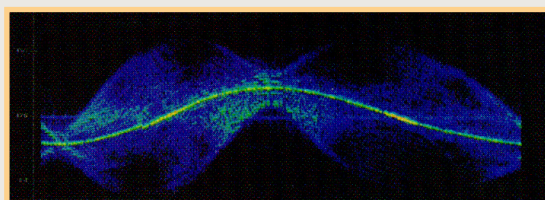
COHERENT DATA PRODUCTS



ISAR Image



Downrange Profile



Doppler Plot